SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

A SCIENCE SERVICE PUBLICATION

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PRINCELY WIG OF GOLD

Ur, 3500 B. C.

(See page 114)

Vol. XIII *No. 359*

NONE of us, whether we are sixty or sixteen, ever ceases being subjected to education. And education secures a "take" on most of us, mild or severe, depending upon the toughness of our intellectual skins.

School doors may close behind us. Nevertheless, the school book is ever with us in its metamorphosed form as newspaper, magazine, novel or more serious reading. If we have learned our lessons well in school, if we have learned to think and plan and do, we become our own teachers. In the laboratory of everyday life we continually perform experiments and learn by experience.

Science Service is doing its share in keeping the world in school. Some four millions daily read Science Service dispatches in newspapers. Such popular extension courses in science supplement the fundamental work of the schools, whose leaders are holding their annual meeting in Boston this coming week.

To teachers of science, this SCIENCE NEWS-LETTER is useful both as a means of contact with new science advances and as an auxiliary text-book which each student may clip and digest. The routine laboratory experiment takes on new meaning when the student realizes that it lies at the base of promising developments in chemistry or engineering.

"Why?" is the most precious question in the world. When students stop asking it, they are lost and the school is useless. The facts of science are in themselves relatively unimportant, but the scientific methods of thought that produce facts (and revolutionize them often) are the stepping stones of progress.

The learning by rote era disappeared with the little red school house. Psychological tests separate the quick from the slow. Students do things instead of just reading about them. The scientific method of education has pervaded those courses not claimed by the field of physical and biological science.

Editorial

Science News-Letter, February 25, 1928

Treasures From Ur

Archæology

The royal graves at Ur of the Chaldees, more than 5,000 years old, are likely to prove more astonishing than Tutenkhamon's famous tomb.

The gold wig, illustrated on the front cover, was discovered in a regal tomb of Ur. It is a work of art that would be conspicuous in any age. The red gold is modeled and engraved to form waves and curls and to make a fillet binding the hair. Cheek plates with curled sideburns curve around the face helmet fashion. Holes around the edge were provided for lacing in a wadding lining, as traces of the wadding material show.

Whether the gold wig was worn in battle as a leader's shining helmet, or whether it was the final touch to a ceremonial costume is unknown to its discoverer, C. Leonard Woolley, director of the Joint Expedition of the University of Pennsylvania and British Museums. When found, the wig lay beside the body of a man of high rank, probably a prince of the royal blood, named Mes-kalam-dug, the Good Hero of the Land.

Gold and silver objects surrounded the hero's body. There was a heap of earrings and finger rings, golden beads, a gold and lapis bracelet. At his waist was a silver belt and a dagger with a gold blade. Golden bowls in the coffin were inscribed with the owner's name.

These gold articles were used and buried 2,000 years before Tutenkhamon's artisans labored to make things worthy of royalty. The Good Hero was buried before the first dynasty of the kings of Ur, about 3500 B. C.

Science News-Letter, February 25, 1928

In This Issue—

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All of the resources of Science Service, with its staff of scientific writers and correspondents in centers of research throughout the world, are utilized in the editing of this magazine.

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The reader can keep up with the new books by reading the *brief book reviews* that appear in each issue.

The great *classics of science* are reprinted and interpreted in order that the present generation can appreciate the long and interesting history through which science has evolved.

Editorial

Science News-Letter, February 25, 1928

If Hospitals Mix Up Babies

Medicine—Heredity

By Marjorie MacDill

In this age of efficiency, when babies come in quantity lots at hospitals, there is a hint of peril in the anonymity of large numbers that makes one look back with some regret to the less aseptic but simpler past. No longer does one arrive upon this terrestrial scene in the privacy of the home, playing a minute but stellar role in an important domestic event.

Nowadays the new arrivals land on this orderly planet as a small part of the day's quota of babies at a maternity hospital. As one of a screaming, undifferentiated lot of bundles in a row of white bassinets in the hospital nursery, identity is only preserved by a strip of lettered adhesive tape and the recording pen of the nurse on duty.

If, for a fleeting instant, thoughts of an interne's natty moustache distract the mind of a uniformed young woman from the important matter of which of two or more newly arrived infants is which, all the king's horses and all the king's men may not put mother and child together again.

Nature has the world's best scientists baffled when it comes to determining absolutely and finally who are a child's parents once a mistake has occurred. It can be told with certainty who are not the parents and who may be the parents, but with all their tests and with all their experiments, it is as yet impossible for scientists to tell without possibility of mistake who are the actual parents in any disputed case.

Maternity hospitals usually are extremely careful and take precautions to prevent mistakes. Immediately after birth the baby is promptly recorded on its mother's case record. Then there is pasted on both mother and child a piece of adhesive tape on which the name is printed in indelible ink along with the number of the case. In some institutions the nurses put on the baby as soon as it is born a necklace of beads that bears the name of the mother. In others the baby's footprints are immediately imprinted on its chart before it is removed from the room in which it is born.

Once in a great while the machinery of the efficient modern hospital slips a cog and babies get mixed as in a recent case in Cleveland when three babies were born to three different Smith families on the same day. Blood tests of the different family groups, made to settle the difficulty rendered only an indecisive verdict. In spite of this failure, however, blood tests are the best means that science can yet muster at the present time to determine parental identity.

MODERN SCIENCE has somewhat more accurate means of determining parents than did Solomon in the famous case pictured in Jordaens' painting

Within the blood of human beings are certain factors that cause the red blood cells of other human beings to agglutinate or clump together. It has been found that people may be divided into various groups according to the numbers and characters of other persons with whom their blood thus reacts. This grouping, once established, is a stable matter and is little influenced either by changes in living or in environment.

Dr. Ludvig Hektoen, director of the John McCormick Institute for Infectious Diseases in Chicago, and an internationally known pathologist who has been interested in the legal aspects of medicine for many years, has described the principle by which blood tests work, as follows:

"The main factors in blood grouping are two inheritable agglutinable substances known as agglutinogens A and B. According to the distribution of agglutinogens A and B, human beings fall into four genetic blood groups: O—no agglutinogen, A—agglutinogen A, B—agglutinogen B, AB—agglutinogens A and B.

"An agglutinogen does not appear in a child unless present in at least one of the parents. As they are inherited as dominant, independent, permanent characters, the agglutinogens can serve as the basis for tests used in studying problems of parentage.

"Three statements will summarize adequately the fundamental relationships between the blood groups of parents and children:

1. The appearance of an agglutinogen in a child means that it must be present in at least one of the parents.

2. Since persons of groups A and B may carry an unapparent but heritable factor which determines the absence of agglutinogen, the recessive O, a child of group O may be born of any combination of groups O, A and B.

3. It is agreed generally, though perhaps still debatable, that a child of group O can *(Turn to next page)*

Babies—*Continued*

not have a parent in group AB, and vice-versa, a child of group AB can not have a parent in group O.

"Refutation of parentage, on the ground of genetic incompatibility of the blood groups in question, is the main definite result of the application of blood grouping to problems of parentage. For the rest only possibilities can be indicated."

The color of the eyes and even the arrangement of hair on the head may also be used to detect the unknown parent of a child. Dark eyes are dominant over blue eyes, while blue-eyed parents always have blue-eyed children. A German scientist has found that the direction of the whorl of hairs on the crown of the head is also an inheritable factor that can be used for identification. The clockwise whorl is dominant over the counter-clockwise.

Dr. Lawrence N. Snyder of the Genetics Laboratory of North Carolina, who has done considerable work on eye color in heredity, believes that by gradually accumulating such tests, the determination of disputed parentage will become more and more accurate.

"A man who fails in several such tests can be considered without doubt as not being the father," he explained. "It must be emphasized, however, that the true father can never be identified by any such tests as these. The extension and application of these principles is an important proceeding, to be carried out carefully, accurately, and as speedily as is consistent with our advances in knowledge."

FOOTPRINTS OF BABIES made at birth remove most of the chance of mixing children in a maternity ward

If certain abnormal hereditary features could be proved to be present in both the child and the family of one of the possible parents, the problems would be greatly simplified. A skeletal defect that is known to have been inherited for a greater number of generations than any other except perhaps the "Hapsburg jaw" is that of stiff finger joints. This condition is technicaly known as "symphalangism" and simply signifies that some of the finger joints in the hand are fused. One of the most famous cases of a hereditary defect of this type is that of the Shrewsbury family in England. Tradition says that John Talbot, the first earl of Shrewsbury, was possessed of stiff finger joints. He was killed in battle near Bordeaux in 1453, by a blow on the head, received after his thigh had been broken. He was buried in Shrewsbury Cathedral. Recent alterations made it necessary to disturb his grave, when tradition was confirmed and his bones identified by the fused finger joints, cleft skull and broken thigh bone. By a strange coincidence this work was under the direction of one of Talbot's direct descendants in the fourteenth generation, the joints of whose fingers were fused like those of his remote ancestor.

Leading scientists admit the inadequacy of medico-legal technique both with respect to cases of uncertain paternity and those that have to do with the detection of crime. There is strong sentiment on foot that this branch of medicine, with its important bearing on the public weal, should receive more atention from physicians and lawyers alike. Dr. Hektoen, whose explanation of blood tests is quoted above, recently made the statement that there will have to be great improvement in medicolegal organization and equipment throughout the country before society can reap anything like full benefit from the advances of science in this direction.

Science News-Letter, February 25, 1928

Blades made of volcanic rock were used for shaving in prehistoric times.

How the Engineer Can Aid Evolution*

Engineering

By John J. Carty

In order to be of use to society, the ideas of the engineer, in every department, in transportation, communication and architecture, must first be embodied in physical form, and because of this he has achieved such a mastery over material things, that he is regarded as preeminently the exponent of a material age. The great utility and economy resulting from his activities are so sensational as to conceal from view the ideals which form the basis of his creative work.

If seeking the truth and applying the truth to the affairs of man, is a spiritual thing, then the engineer must be absolved from the charge of materialism. He is an advocate for truth. His works must be tried in the inexorable court of Nature, where no errors are committed and no exceptions granted. The work of the engineer is dedicated to the use of mankind, and the pecuniary compensation which he himself obtains is slight compared with the great benefits received by society. He finds inspiration and reward in achievement, and his real compensation is the good which others derive from what he has done.

* * * * *

We are told that man has come from a lowly origin, and that during ages of time incalculably long he has advanced to his present position at the head of the animal kingdom. It has been supposed that in man himself, this evolutionary process is still at work, and that therefore, in the course of the ages he will evolve into a superlative type, and then perhaps all will go well.

Inasmuch as this evolutionary process in man himself is said to have taken vast periods of time, it is not unreasonable to expect that further ages must elapse before salvation by this form of evolution could be achieved.

* * * * *

But this is not all that evolution has to offer. For, even if this one pathway should be closed to further great progress during our age, we are assured by that eminent authority, Professor Edwin Grant Conklin, that there are two others which are open to us.

The first of these to be considered is one which is preeminently under the control of the engineer. Conklin tells us that the evolution of man, the individual, is no longer limited to his body or mind; but by adding to his own powers the forces of nature, man has entered upon a new path of progress. The differentiations of various members of a colony of ants or bees, he tells us, are limited to their bodies and are fixed and irreversible. But in human society, differentiations are no longer confined to the bodies of individuals, but have become as it were extra-corporeal. And by his control over nature, man has taken into his evolution the whole of his environment. Although he is not as strong as the elephant, nor as deft as the spider, nor as swift as the antelope, nor as powerful in the water as the whale, nor in the air as the eagle; yet by his control of the forces of nature outside of his body, he can excel all animals in strength and delicacy of movement, and in speed and power, on land, in water, and in air.

The true object of engineering is not to create machines to which men will be bound by the chains of necessity, or mechanisms to which they will become slaves. The mission of the engineer is to obtain such a mastery in the application of the laws of nature, that man will be liberated, and that the forces of the universe will be employed in his service. According to Conklin, this new path of progress is in all respects the most important which has ever been discovered by organisms, and no one can foresee the end of this process of annexing to our own powers the illimitable forces of the universe.

Concerning the other pathway of evolution, he tells us that progress in intellectual evolution, no less than in physical, lies in the direction of increasing specialization and cooperation. But this progress, he says, is no longer taking place within the individual, but in the specialization and cooperation of many individuals. The intellectual evolution of the individual may have come to an end; but whether or not this is true, it is certain that the intellectual evolution of groups of individuals is only at the beginning. In social evolution—the evolution of human society—Conklin says a new path of progress has been found, the end of which no one can foresee.

Progress along this pathway, also, is vitally dependent upon the work of the engineer, for the perfection of all forms of communication and transportation is essential in order that this new super-organism, human society, shall achieve its destiny.

Emphasizing the importance of this, Trotter, another distinguished writer on evolution, tells us that the capacity for free intercommunication between individuals of the species has meant so much in the evolution of man, and will certainly come in the future to mean so incalculably more, that it cannot be regarded as anything less than a master element in the shaping of his destiny.

The use of the spoken word to convey ideas distinguishes man from all other created things. It is the function of the engineer to provide for the extension of the spoken word by means of electrical systems of intercommunication which will serve to connect the nervous system of each unit of society with all of the others, thus providing an indispensable element in the structure of that inconceivably great and powerful organism which it is believed will be the ultimate outcome of the marvelous evolution which society is to undergo.

There is one element, and only one, which stands in the way of the realization of this inspiring vision. That is man himself, for he is the unit or cell out of which the new organism is to be evolved. In the individual animal organism, the units or cells are physically joined to each other; but in the social organism, the units are individuals, not physically joined, but free to move about at will. The connection between these separate and mobile units is accomplished by communications, which convey information, ideas, and impulses from one mind to another. Whether these communications shall be employed in peaceful, constructive cooperation, or whether they shall be used to engender conflict and confusion, depends upon man himself.

Already, the applications of science to human affairs have far outrun the ability of man to use them wisely. The engineer has provided agencies of incalculable value in time of peace, but they are also *(Turn to next page)*

*Extracts from address by General John J. Carty, Vice-President of the American Telephone and Telegraph Company, in accepting the John Fritz Medal of the American Institute of Electrical Engineers.

Evolution—*Continued*

endowed with prodigious powers of destruction which can be loosed in time of war. Unless we solve the problem encountered in man himself, the outlook is dark indeed, and it may even be questioned whether our civilization will endure.

Human behavior presents the most important and the most formidable problem of all the ages. Its solution can be achieved only by profound and prolonged researches, which shall bring to bear upon every phase of the subject all of the resources of science.

While, in such a consideration as this, it would be folly to ignore the claims of religion and philosophy, it would be a grave error to conclude that, in order to avoid disaster, we must restrict progress in the application of science to material things. On the contrary, we must accelerate progress in all the sciences, for the knowledge thus gained will be required in preparing the individual man to function as a sane and peaceful unit in the ultimate social organism.

Scientific research in our universities and elsewhere, conducted solely for the increase of knowledge, should receive more adequate financial support, so that it may be prosecuted with ever-increasing vigor. If this is done, I believe that in the fulness of time, by further scientific discoveries, the physical development of man will be improved, that many diseases will be entirely eliminated, and that immunity to the others will be achieved, and that feeble-bodiedness and feeble-mindedness will disappear. Thus will be removed some of the greatest barriers to social progress.

In the great plan of evolution, the part assigned to the engineer calls for the highest exercise of his creative faculties, for he is to direct the evolution of man's extra-corporeal powers, providing him with more numerous and still more powerful additions to his feeble bodily equipment.

The ideals of the engineer will not be realized until man has achieved his destiny in that social organism which is foreshadowed "with its million-minded knowledge and power, to which no barrier will be insurmountable, no gulf impassable, and no task too great."

Science News-Letter, February 25, 1928

Writings of Aristotle describe the method by which the Greeks backed glass with metal foil to make mirrors.

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Divining Rods Probe Earth's Riches

Geology

Probing into the depths of the earth, inaccessible to the miner's eye or drill, the geologist is now determining the location of valuable oil and minerals through the use of instruments and methods that up until a few years ago were not known outside of scientic laboratories.

Engineers at sessions of the American Institute of Mining and Metallurgical Engineers in New York discussed the application of these modern "divining rods" to the discovery of new mineral riches.

Gullible miners and landowners have been fooled and humbugged in past years by unscientific diviners who claimed to be able to locate hidden oil, coal, and minerals by rods or devices that they held in their hands. Farmers have hired these rural mystics to determine where to dig wells. Such methods of prospecting have been discredited. Through the use of the principles of physics, however, the geologist has realized the wishful claims of the impostors and now by an array of complicated instruments can advise the mining engineer where to drill or dig in order to try for oil or metal.

Prospecting by geophysical methods is possible because the rocks and other deposits in the earth have different physical properties which can be detected by suitable apparatus at the surface, Dr. Hans Haalck, scientific expert for German and American exploration companies, told the engineers. Geophysical prospecting is now possible practically by gravimetric, magnetic, seismic, and electric methods.

Masses of light or heavy materials within the earth affect the gravitation of the earth nearby and can be detected with a pendulum or gravity balance, like the Eotvos torsion balance. Such information about internal structure aids the geologist to determine where to drill for oil, for instance.

Various kinds of rocks have different degrees of magnetization and consequently vary the magnitude and direction of the earth's magnetic field. Refined forms of the compass and similar instruments allow the geologist to measure any magnetic irregularities and speculate upon the cause.

Artificial earthquakes can be caused by small explosions and recorded on seismographs in order to determine the difference in elasticity of the underlying rocks. This information gives clues to mineral deposits and formations in some instances.

Electric currents passed through the earth sometimes give valuable information since different kinds of rocks have differing conductivities.

Other methods not yet in wide practical application include: Radioactivity measurements, transmission of radio waves, temperature records, measurement of natural earth currents, etc.

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More Mineral Research

Geology

More knowledge of how nature laid down mineral riches within the earth is needed in order effectively to maintain the great mining industry of the United States which produces metals to the annual value of $1,400,000,000, Dr. Waldemar Lindgren, Chairman of the National Research Council's division of geology and geography and Professor at the Massachusetts Institute of Technology, told the recent meeting of the American Institute of Mining and Metallurgical Engineers.

The United States is falling behind in the investigation of metallic ores, necessary for the discovery of new depostis and for the effective exploration of known deposits, Dr. Lindgren declared. Close investigation in the distribution and geological relations of ore deposits is needed as well as research into the composition and structure of ores.

Experimental work to ascertain the physical conditions of ore deposition was also suggested by Dr. Lindgren as a method of study as important as describing the actual mineral deposits themselves. He urged the mining industry to establish a research laboratory and spend for research a mere one ten-thousandth part of the value of the metals that it mines annually.

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New Buoyant Fiber from Mexico

Botany

Kapok, the light, buoyant fiber now imported from the East Indies by the thousands of tons for use in life preservers and mattresses and for many other purposes, may soon have to meet with serious competition from an even lighter and more waterproof fiber grown under the American flag.

Pochote is the name of the new fiber. It is the product of a Mexican tree, and has long been harvested from wild specimens by the Indians and used in a small way. But the possibilities of the long silky hairs that pack its seed pods have now been recognized by the U. S. Department of Agriculture, and according to Lyster H. Dewey, fiber specialist, experimental plantings on a large scale are now being made in Porto Rico.

In an experiment performed in the Department of Agriculture laboratories, a pochote float was loaded with fifteen times its own weight in lead, and left in a vessel of water 189 days without showing any signs of sinking. A similar load sank a kapok float in 25 days.

The fibers, of which four or five pounds can be harvested from a tree, are stiffer and smoother than those of cotton, so that they can not be woven into cloth or matted into felt. Instead, they spring apart, forming an exceedingly light, fluffy mass. It is this quality that makes them valuable for cushions and mattresses.

It also makes them exceedingly useful for packing the walls of refrigerators and for other heat-insulating purposes, and it is partly at the instance of manufacturers interested in heat-insulation that the experimental plantations are being set out in Porto Rico.

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Cadmium in Solders

Metallurgy

Cadmium, chemical brother to zinc, is finding a useful place in industry as one of the components of special solders, according to Carl E. Swartz, metallurgist of Shelby, Calif. Lead, tin and zinc are the metals in such common solders as those in sealing tin cans, but where lithographed labels are used on tin cans a special solder containing cadmium is now used because its lower melting point prevents discoloration of the lithographing.

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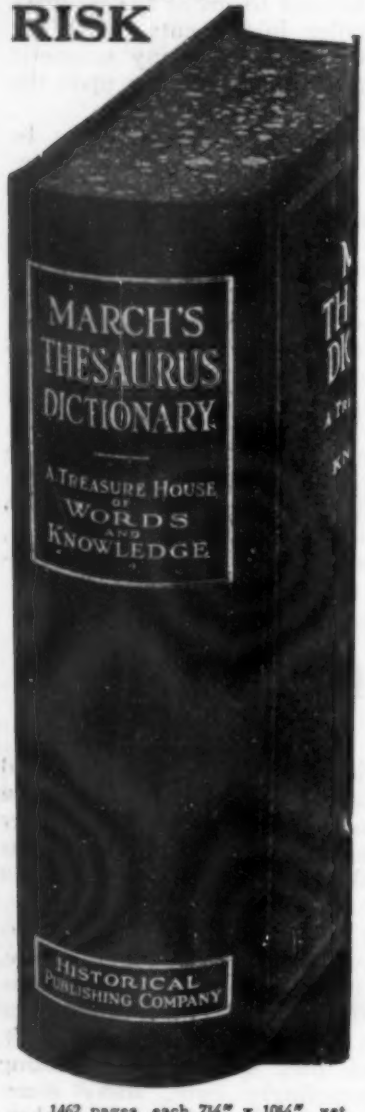

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Physics—Chemistry

Make a spectroscope after the directions of Kirchhoff and Bunsen, given below, and see the spectra given off by the metals of the two alkali groups as they color the flame of the familiar burner, invented by the same Bunsen.

CHEMICAL ANALYSIS BY SPECTRAL OBSERVATIONS, by G. Kirchhoff and R. Bunsen. Poggendorf's Annalen, Band 110, 1860. Translated by D. B. Brace, published in The Laws of Radiation and Absorption. New York, 1901.

Bright Line Spectra

It is well known that many substances have the property when they are brought into a flame of producing in the spectrum certain bright lines. We can found on these lines a method of qualitative analysis which greatly enlarges the field of chemical reactions and leads to the solution of problems, unsolved heretofore. We shall confine ourselves here only to the extension of the method to the detection of the metals of the alkalis and the alkili earths and to the illustration of their value in a series of examples.

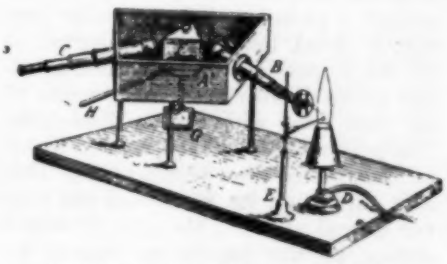
The lines referred to show themselves the more plainly, the higher the temperature and the weaker the natural illuminating power of the flame. The gas lamp described by one of us gives a flame of very high temperature and very small luminosity; this is consequently especially adapted to investigations on those substances characterized by bright lines. . . . .

The potassium compound used for the investigation was obtained by heating chlorate of potassium which had been six to eight times recrystallized beforehand.

The chloride of sodium was obtained by combining pure carbonate of sodium and hydrochloric acid and purifying the same by repeated crystallization.

The lithium salt was purified by precipitating fourteen times with carbonate of ammonium.

For the production of the calcium salt a specimen of marble as pure as possible, and dissolved in hydrochloric acid, was used. From this solution the carbonate of calcium was thrown down by a fractional precipitation with carbonate of ammonium in two portions, of which only the latter, precipitated in calcium nitrate, was used. The calcium salt thus obtained we dissolved several times in absolute alcohol and converted it finally into the chloride by evaporating the



APPARATUS FOR SPECTRUM ANALYSIS

alcohol and by precipitation with carbonate of ammonium by hydrochloric acid.

In order to obtain the pure chloride of barium we extracted it from the commercial salt by pulverizing and boiling repeatedly in nearly absolute alcohol. The residue thus extracted and freed from alcohol was dissolved in water and thrown down by fractional precipitation in two portions, only the second being dissolved in hydrochloric acid, and the barium chloride thus obtained being further purified by repeated crystallizations.

In order to obtain chloride of strontium, as pure as possible, the commercial salt was crystallized out from alcohol, and fractionally precipitated in two portions with carbonate of ammonium, the second part being dissolved in nitric acid and the nitrate freed from the last traces of calcium by pulverizing and boiling with alcohol. From the product thus purified the chloride of strontium was obtained finally by precipitating with carbonate of ammonium and dissolving the precipitate in hydrochloric acid. All these purifications were made in platinum vessels as far as it was possible.

The Spectroscope

The figure represents the apparatus which we have used mainly in the observation of the spectra. *A* is a box blackened on the inside the bottom of which has the form of a trapezium and rests on three feet; the two inclined sides of the same form an angle with one another of about 58° and carry the two small telescopes *B* and *C*. The ocular of the first is removed and replaced by a plate in which is a slit formed of two brass cheeks which are placed at the focus of the objective. The lamp *D* is so placed before the slit that the mantle of the flame is intersected by the axis of the tube *B*. Somewhat beneath the point where *(Turn to next page)*

News of the Hittites

Archæology

On a high plateau in Asia Minor lie the desolate ruins of the largest city of the ancient Hittite Empire, is the report by H. H. von der Osten, of the Hittite Expedition of the Oriental Institute, University of Chicago.

The existence of a city at this remote place has long been known, but the site has hitherto been ignored by scientists. Mr. von der Osten, while excavating at a Hittite site nearby, journeyed to the plateau and surveyed the huge city area which is still outlined by broken down stone walls.

The walls of the city were originally more than 13 feet thick, he reported. The walls were strongly fortified by rounded towers set at strategic points, and on a mountain top rising on the plateau are the remains of a fortress. Fragments of pottery lying on the surface of the stone heaps are pronounced characteristic Hittite pottery and also Roman and Byzantine.

The city buried beneath the stones and drifting soil dates back more than 3,000 years. It must have been a great city at the time when Tutankhamon's young widow offered her hand to a Hittite prince in a vain, desperate attempt to save her Egyptian throne.

A campaign of at least seven or eight years would be needed to investigate the huge ruin, in Mr. von der Osten's opinion, and even a detailed survey of the surface would require six months.

Children of the Hittite race who went to school in Asia Minor about 1000 B. C. had to learn dead languages just as the modern school boy learns Latin. Baked clay tablets found in the capital city of the ancient Hittite Empire have been deciphered by scholars who say that eight languages are represented on them, written in the neat, wedge-shaped characters known as cuneiform writing.

The Sumerian language was then long dead, but the Hittites learned it and taught it to their children because they believed that charms sung in the old language were peculiarly effective. In some of the tablets, the Sumerian text is followed by columns containing the same text translated into official Hittite language and into Babylonian, and also a column pronouncing the Sumerian words. Babylonian was apparently the language of diplomacy among the Hittites. *(Turn to next page)*

Hittites—*Continued*

Several thousand tablets were discovered in a palace and a temple used as a record office, by German archæologists some years ago, but early attempts at reading them were hampered because the different languages were not sorted out. Writers of long records on the baked tablets were careful to indicate the sequence from one tablet to the next, and usually at the end of the document the author wrote his name, his profession, and place of residence, in modern fashion.

Science News-Letter, February 25, 1928

Bacteria average about one twenty-five thousandths of an inch in length.

The temperature in Alaska has been known to mount to 100 degrees in the shade.

The mocking bird is being urged for adoption as the state bird of Texas.

Opium provides over one-fourth of the revenue of Indo-China and British Malaya.

Spectroscope—*Continued*

the axis meets the mantle the end of a very fine platinum wire bent into a small hook and carried by the holder E passes into the same; on this hook is melted a globule of the chloride previously dried. Between the objective of the telescopes B and C is placed a hollow prism F with a reflecting angle of 60° and filled with carbon disulphide. The prism rests on a brass plate which can be rotated on a vertical axis. This axis carries on its lower end the mirror G and above it the arm H which serves as the handle to rotate the prism and the mirror. A small telescope is adjusted before the mirror which gives an image of a horizontal scale placed at a short distance. By rotating the prism we can cause to pass before the vertical thread of the telescope C the entire spectrum of the flame and bring every portion of the spectrum into coincidence with this thread. To every reading made on the scale there corresponds a particular portion of the spectrum. If the spectrum is very weak the cross hair of the telescope C is illuminated by means of a lens which throws some of the rays from a lamp through a small opening which is placed laterally in the ocular of the telescope C.

Lines Characteristic of Metals

The spectra obtained by means of the pure chlorides above mentioned we have compared with those which we obtained if we introduce the bromides, iodides, hydrated oxides, sulphates, and carbonates of the several metals into the following flames:

into the flame of sulphur,
into the flame of carbon disulphide,
into the flame of aqueous alcohol,
into the non-luminous flame of coal gas,
into the flame of carbonic oxide,
into the flame of hydrogen and
into the oxyhydrogen flame.

From these comprehensive and lengthy investigations whose details we may be permitted to omit, it appears that the difference in the combinations in which the metals were used, the multiplicity of the chemical processes in the several flames, and the enormous differences of temperatures of the latter *exert no influence on the position of the spectral lines corresponding to the individual metals.*

Robert Wilhelm von Bunsen was born March 31, 1811, at Göttingen and died August 16, 1899, at Heidelberg. At 17 he entered the university at his home, at 23 he became a Privat-docent, at 25, teacher of chemistry at the Polytechnic School of Cassel. The next year he began reasearches on cacodyl compounds which lasted six years, cost him the sight of one eye and a bad case of arsenic poisoning, and were the forerunner of later work on arsenicals and other metallo-organic compounds by other chemists. At 28 Bunsen became professor of chemistry at Marburg, where he took up the study of photometric measurements and invented the grease-spot photometer. In 1846, on a vacation trip, he visited Iceland and studied the geological formations there, particularly the geysers, at that time the only known geysers in the world. In 1851 Bunsen went to Breslau, where he met Kirchhoff. The following year Bunsen accepted the chair of chemistry at Heidelberg, and was joined in 1854 by Kirchhoff as professor of physics. Here the two collaborated on the photometric and spectroscopic researches which were the crowning achievement of both men.

Gustav Robert Kirchhoff was born March 12, 1824, at Königsberg, and died October 17, 1887 in Berlin. He attended the university near his home and received his Ph.D. at the age of 23. He was a Privatdocent in Berlin until 1850, when he went to Breslau as extraordinary professor of physics. There, the following year, he met Bunsen. In 1852 he followed Bunsen to Heidelberg, where their joint researches in spectroscopy were made, in 1859-60. Kirchhoff was at that time 35, Bunsen 48. Kirchhoff's other work was in electricity and mathematical physics. His principal book is "Vorlesungen über Mathematische Physik," published in 1876, the year following his removal from Heidelberg to Berlin. Kirchhoff died twelve years before the death of Bunsen, who was 13 years his senior.

Science News-Letter, February 25, 1928

Science Helps Lower Steel Costs

Metallurgy

One of the greatest industrial battles in years is the struggle of iron and steel manufacturers to retain a reasonable margin of profit. Scientists are bringing forth many new ideas as weapons against loss. Some of their plans, if successfully applied, may revolutionize the whole industry. Others seek to cut off a cent from the cost here and another cent there and little by little keep the production cost down.

Much money is spent by the industry for improvement. Unfortunately, manufacturers declare, in some instances cost of production is advanced so rapidly by adverse economic conditions that the profit gained through improvements can hardly keep abreast.

It is stated that one of the most substantial improvements made recently lies in the use of electricity as a source of motive power. The Youngstown, Ohio, Sheet and Tube Company is installing high pressure boilers to run electric generators at its plant. The boilers will be fired by the waste from coke ovens. Electric motors used for driving rolling mills, conveyors and other machinery are more economical because they permit the operation of one unit at a time. They increase the flexibility of the mill operation and thereby save time and labor, it is said. Plants located near sources of water power are calling upon it to furnish electricity for more economical operation.

In the struggle against advancing costs, iron and steel manufacturers are adopting a more diversified output. They are taking advantage of the fact that if the market for rods and strips slumps they can keep their mills going by turning out tinplate.

Chemists and metallurgists are eyeing the blast furnace critically. "This business of shipping iron ore from way out in Minnesota seems to be a waste of money," say some. "Why can't we ship iron instead of ore with all its impurities?"

With the use of the blast furnace, iron and steel plants must have a means of manufacturing coke. This entails the operation of a gas plant, in most cases. The University of Minnesota has been experimenting with the combination of gas plant and blast furnace. They mix the ore and put the mixture into a coke oven similar to those used in the manufacture of coal gas. They heat the mixture. The iron comes out in a crumbly form and is pressed into cylindrical blocks for shipment to steel plants. It is declared that iron produced in this manner near where it is mined costs a few cents less after shipment to Pittsburgh than iron manufactured in blast furnaces at Pittsburgh.

A process similar to this for the elimination of the blast furnace is being tried by the United States Steel Corporation in its plant at Lorain, Ohio. Metallurgists are reluctant to predict how successful this experiment will be, however.

Metallurgists are continually seeking more economical methods in the use of fuel. They have found that the admonition "cleanliness is next to godliness" holds true in the manufacture of iron and steel as well as in human life. More care is being taken with the cleaning of coke before it goes into the blast furnace. Cleaning of coke eliminates ash. As little as one per cent. of ash taken from the coke takes twenty cents off cost of production of pig iron, it is claimed.

Manufacturers are seeking greater fuel economy in the open hearth furnace where the greatest steel tonnage is manufactured. Before gas and air in this furnace reach the charge that is to be melted down, they pass through heated chambers stacked with fire brick. These chambers comprise the regenerator. In an effort to make the operation of the regenerators more efficient, the bricks are being stacked in new arrangements to get as much heating surface as possible in a small space. Bricks made of carborundum, which will withstand a higher temperature, also are being tried.

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Speed—3 Miles Plus Per Minute

Automotive Engineering

A racing car created to achieve the highest possible short spurt of speed flashed along the sands of Daytona Beach, Florida, and smashed the world's auto speed record of 203.79 miles an hour established last year by Major H. O. D. Segrave in an English-made Sunbeam car.

It was Capt. Malcolm Campbell in his famous English racing car, Blue Bird, which achieved the average speed of 206.956 miles an hour over measured mile courses, with and against the wind. His American rival was a special Stutz designed by F. E. Moskovics and piloted by Capt. Frank Lockhart.

The details of the Blue Bird have been closely guarded but it is known that it is powered with the same type of Napier engines that were used in English airplanes that last year won the Schneider Trophy race in Italy and set the world's air speed record of 281.669 miles per hour. The front of Capt. Campbell's car is carefully streamlined and its nose is suggestive of a whale. Detachable wings on its tail intended to prevent skidding give it the appearance of being about half airplane, while the radiators are placed on each side of the stern instead of in front. Airplane development contributed to the design of the Blue Bird.

One unique feature of the American car is that it is cooled with ice, eliminating radiator entirely. Engineers estimate that this saves about 60 horsepower that would be used in the cooling apparatus. Since the runs are very short, only about four or five minutes, it is possible to utilize a cooling method that would be impractical in an ordinary automobile. Elimination of the radiator reduces the wind resistance greatly and allows the nose of the car to be hermetically sealed. The car is completely streamlined, even the wheels being covered so as to slide through the air with the smallest possible effort. The wheelbase is 112 inches, the width of the car is 24 inches with a 42-inch track. Its greatest height is 42 inches at the driver's headrest while the height of the rest of the car is only 32 to 36 inches. Two powerful eight-cylinder engines each with its own crank shaft feeding into a common transmission with worm drive slung under the rear axle, furnish the power.

Science News-Letter, February 25, 1928

NATURE RAMBLINGS

By FRANK THONE

Natural History

The Bumblebee's Sleep

A short time since, we concerned ourselves somewhat unnecessarily over the mythical awakening of the groundhog, and the chances of that interesting mammal's having seen his highly important shadow.

But if we depended on other hibernating creatures as weather prophets we should have less anxiety about shadows. The bumblebee, for one, will never see her shadow on Candlemas Day. She will be getting up early if she sees it by Easter. For creatures with a reputation for industry bees, and especially bumblebees, spend a most unconscionable amount of time in sleep. Late in summer or early in autumn, large female bumblebees go forth from every bumblebee nest, and proceed to dig themselves in. They sleep in their little burrows more than half-way round the calendar. While the weather is still warm, they do not sink into the deep and death-like slumber of true hibernation, and if disturbed can dig themselves another burrow and fall asleep again. But after frost comes they become profoundly unconscious, and remain so until spring warmth arouses them. This deep sleep of hibernation is quite probably a matter of physiological economy, for the bee must depend on the food stored in her own body tissues, plus a gorged crop from a last drink at the honey pots of the home nest.

In the spring, the sleeping bee will fare forth, find some nectar on which to feed, and then hunt a nesting place—preferably an abandoned fieldmouse burrow. Here she cleans house, deposits her first eggs, and nurses her first brood. After the new young bees—always smaller than their mother—mature, she does no more foraging, but remains in the hive as queen, devoting herself wholly to the duties of maternity.

Multiple Walls Subdue Deep Sounds

Physics

Multiple layered walls are the most efficient absorbers for deep musical sounds, Dr. E. C. Wente and E. H. Bedell have discovered as a result of experiments at the Bell Telephone Laboratories.

Radio studios, auditoriums and other places, where echoes are troublesome and must be carefully controlled, can be made to have better acoustic properties through the use of a thin, perforated partition, set a short distance out from the main wall.

Formerly such sound studies had to be made in a large room, with good sized pieces of the material to be tested. Dr. Wente and his associate have invented a way of testing in a small tube, and they claim that it gives results as satisfactory as with the older method. At one end is a telephone receiver to furnish the sound of any desired pitch. Sliding in the other end is a piston, with which the material undergoing test is covered. The echoes formed are studied with a still smaller tube that goes into the main tube at the end near the telephone receiver. On the outside, at the end of this small tube, is a telephone transmitter with which the sounds can be picked up and analyzed.

Sounds of high pitch are largely absorbed by layers of felt, porous "acoustic tile" or wood fiber mixed with felt. Even with the best of such sound absorbers, deep, or low frequency, sounds pass through rather easily. But if the wall is covered with felt, and then, an inch away, a piece of perforated building board is placed, the low frequency sounds are much more completely absorbed. Still better is the effect of two layers of building board, with two air spaces.

Indian Children Heavier in Weight

Anthropology

When social workers at the Kansas Bureau of Child Research set out to make some individual growth studies of Indian children, they found the little brown-skinned Americans so much heavier than the white children of the same age that the ordinary height-weight-age tables did not "fit" them at all.

Through the courtesy of H. B. Peairs, formerly superintendent of Haskell Institute, a federal Indian school at Lawrence, Kansas, data and measurements were obtained on 21,637 Indian girls and boys from government Indian schools throughout the country from which a new set of tables were constructed. Contrary to what one would expect, the Indian children were found to be shorter as well as heavier than their white brothers and sisters. The Indian boys ran from one to four inches shorter and from one to six and a half pounds heavier than white boys, while Indian girls were from one to two inches shorter and from one and a half to four and a half pounds heavier than their white contemporaries.

"Considering the fact that the tables represent many degrees of admixture from around eighty tribes," said Miss Emily H. Ferris of the Child Research Bureau, "it is probable that they show in a highly modified degree the structural differences between full-blooded Indian children and American white children."

Vast Rose Garden

Botany

One thousand varieties of roses are included in the vast rose garden of the University of Texas at Austin. Every known variety of rose grown in Texas and many varieties from other states are among the specimens in this remarkable garden, one of the largest in the world. The garden is under the supervision of Dr. B. C. Thorp, Professor of Botany at the University of Texas. The rose garden is a part of the Texas Botanical Garden which was established two years ago.

Defending Herons

Ornithology

German lovers of birds are up in arms over an attack being made by fisheries interests on the heron, a beautiful bird given careful legal protection in America and other countries. The herons of the Moehne valley in Westphalia have been accused of destroying undue numbers of fish, and a bounty of nine marks per head has been placed on them. The defenders of the herons declare that it has been possible to protect the Rhine fisheries without exterminating the herons there, and claim that there is no need to kill off the birds.

Glances at New Books

Animal Life of the Carlsbad Cavern — Vernon Bailey — *Williams and Wilkins* ($3). This scientific guide describes the animal life near a recently explored addition to our national wonders, as well as the creatures that dwell in its sunless depths. Everyone who journeys into the Southwest should see Carlsbad Cavern, and should study this book as a preface to his visit.

Zoology

Science News-Letter, February 25, 1928

Science of Animal Life—William Morton Barrows — *World Book Co.* ($1.75). A textbook of elementary zoology, well illustrated and for the most part clearly written. Evolution is not so much as mentioned by name, but appears as an hypothesis under the alias "adaptive radiation."

Zoology

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Three Young Crows and Other Bird Stories—Ernest Harold Baynes —*Macmillan* ($1.75). A series of anecdotes of experiences with birds.

Zoology

Science News-Letter, February 25, 1928

Suicide — Ruth Shonle Cavan — *Chicago Press* ($3). The author has dredged up an enormous amount of statistical and psychological information about suicides for the rest of the world to see and heed.

Sociology—Psychology

Science News-Letter, February 25, 1928

Year Book, 1926-1927—*Carnegie Institution of Washington.* This report covers a year's progress by the departments of a leading American scientific institution which in a vast multitude of researches expends over a million and a half.

General Science

Science News-Letter, February 25, 1928

Mirrors of the Year—Edited by Horace Winston Stokes—*Stokes* ($4). Since the chapter on science in this "revue of outstanding figures, trends and events of 1927-8" is by Science Service, we may be considered prejudiced in what we say about it. There is nothing of the dry fact and figures of ordinary yearbooks in this collection of articles by such authorities as Bryd, Wharton, Phelps, Bromfield, Sherwood, Erskine, Seibold and others. To read it is to understand better just what happened last year.

History

Science News-Letter, February 25, 1928

In some towns in the United States 90 per cent. of the street trees are maples.

Wood Cellulose Rivals Cotton

Chemistry—Agriculture

King Cotton must abdicate in what was once considered to be the very heart of his realm, the southeastern states. From central Mississippi eastward, it costs so much to grow cotton that the high-priced product can not compete with the low-priced cellulose now being manufactured from wood and soon to be made from cornstalks. This thesis is boldly laid down by Dr. William J. Hale, director of organic chemical research of the Dow Chemical Company.

"The old practice of raising cotton in this section seems destined to obsolescence," said Dr. Hale. "The cost of growing cotton in this section is approximately ten cents per pound and yet you must face the inroads of alpha cellulose from woody fiber offered on the market at eight cents. Millions of pounds of cotton will be displaced from industrial use this year in the manufacture of rayon and nitrating paper. Even cotton linters at four cents per pound can not compete long, but possibly at two cents may still find considerable use. In other words, cotton must be driven to ten or twelve cents per pound if it is to hold its position in the textile world."

Cotton will still hold its own west of the Mississippi, where it can be produced at five or six cents per pound, Dr. Hale believes. In the Southeast, its cultivation can be continued at a profit for some years to come on the larger plantations, but the smaller farmer will do well to look at once for other crops. Dr. Hale recommended especially peanuts, which can be pressed for a high-grade food oil. Their shells also have good potentialities as industrial material. Sugar cane, where it can be grown, and sorghum to the north of the sugar cane belt, were other suggestions. Besides their yield of sugar and molasses, these plants are coming into an immense demand as sources of fiber for artificial lumber.

Science News-Letter, February 25, 1928

Reindeer Eat Eskimo Lampwicks

Zoology

Reindeer lichen, or "moss" as it is more frequently called, furnishes the best winter fodder for the vast reindeer herds of Alaska for the same reason that is used to be the Eskimos' best wicks for their primitive stone blubber lamps. Dry as the proverbial shavings during the summer, the lichen soaks up snow water like a wick, and thereby becomes soft and succulent and fit for the adequate chewing apparatus of the reindeer. Supplementary winter browse is also provided by great beds of sedge that grow in the wet tundras.

The so-called "barren ground" of interior Alaska is not as bad as its name might seem to indicate, states William B. Miller of the U. S. Department of Agriculture, but furnishes lichens, brush and other fodder to vast herds of animals. Eastern Alaska is held by the native caribou, fine animals and larger than the reindeer, but wild and not adapted to herding. Western interior Alaska, together with the coastal regions and the islands, have been taken over by the reindeer.

Reindeer were introduced from Europe in the early nineties. In 1892 there were only 1280 animals in Alaska; the latest estimates place their present numbers at about half a million. The main problem now is to devise an efficient and economical system of getting their meat to market.

On some of the islands experiments are being made in hybridizing reindeer with their larger cousins the caribou, but it is too early as yet to expect any definite results.

Science News-Letter, February 25, 1928

Smoke Injures Crops

Metallurgy—Agriculture

The Ruhr industrial region, recently restored to normal operation following the withdrawal of the French, has given a striking illustration of the damage wrought by factory smoke not only to trees and gardens in the cities but to the farm crops throughout the countryside. When the French occupied the region in 1923 the Germans adopted a policy of "passive resistance," closing down all the factories. With the air cleared of its load of smoke and acid fumes, the farms of the Ruhr valley yielded full crops for the first time in many years. Then the French withdrew and the chimneys started smoking again, and now the crops have dropped back to their previous low level.

Science News-Letter, February 25, 1928